Statistics
Normal Distribution Test REVIEW

Name: ______________________
Date: ______________________

1. Assume human body temperatures taken via the ear follow a Normal model with a mean of 98.7°F and a standard deviation of 0.7°.

   a. What percent of people have ear temperatures that are 1 or more **standard deviations** greater than the mean?

   $P(Z > 1) = 100\% - 84.13\% = \boxed{15.87\%}$

   b. What percent of people have ear temperatures that are 1 or more **degrees** greater than the mean?

   $Z = \frac{99.7 - 98.7}{0.7}$

   $Z = 1.43$

   $P(Z > 1.43) = 100\% - 92.36\% = \boxed{7.64\%}$

   c. An ear temperature of 97°F **or less** may indicate hypothermia (low body temperature). What percent of people have ear temperatures that may indicate hypothermia? (1pt)

   $Z = \frac{97 - 98.7}{0.7}$

   $Z = -2.43$

   $P(Z < -2.43) = \boxed{0.75\%}$

   d. What are the ear temperatures of the lowest-scoring 2.5% of the population?

   $P(Z = ?) = 0.025$

   $Z = -1.96$

   $-1.96 = \frac{x - 98.7}{0.7}$

   $x = 97.328$

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e. What percent of people have temperatures greater than 100°?

$Z = \frac{100-98.7}{0.7}$

$Z = 1.86$

$P(Z > 1.86) = 100\% - 96.86\%$

$= \boxed{3.14\%}$

f. Find the third quartile (75th percentile) for temperatures.

$P(Z = ?) = 0.75$

$Z = 0.67$

$\frac{0.67}{1} = \frac{x-98.7}{0.7}$

$\boxed{x = 99.169}$

g. What percent of people have temperatures between 97.5° and 98.2°?

$Z = \frac{97.5-98.7}{0.7}$

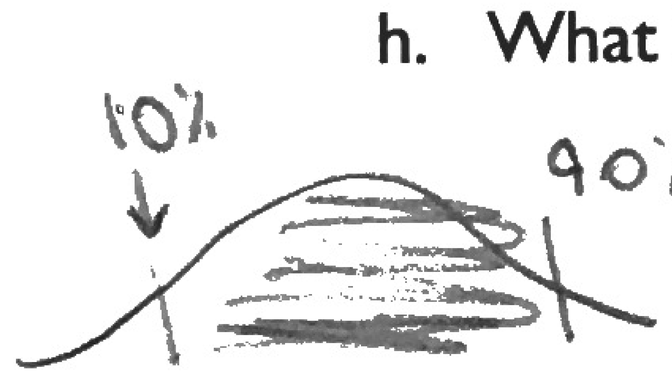
$Z = -1.71$

$Z = \frac{98.2-97.5}{0.7}$

$Z = 1$

84.13%
$-\ 4.36\%$
$\boxed{79.77\%}$

h. What is the range of ear temperatures for the **middle 80%** of people?



$P(Z = ?) = .10$

$Z = -1.28$

$\frac{-1.28}{1} = \frac{x-97.5}{.7}$

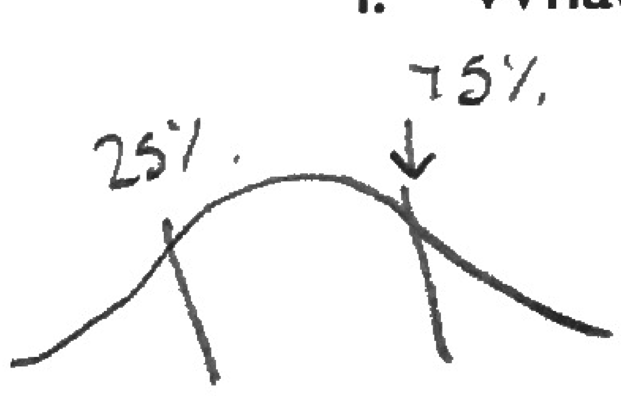
$P(Z = ?) = .90$

$Z = 1.28$

$\frac{1.28}{1} = \frac{x-97.5}{.7}$

$\boxed{96.604 \text{ to } 98.396}$

i. What is the range of ear temperatures for the **middle 50%** of people?



$P(Z = ?) = .25$

$Z = -0.67$

$\frac{-0.67}{1} = \frac{x-97.5}{0.7}$

$P(Z = ?) = .75$

$Z = .67$

$\frac{.67}{1} = \frac{x-97.5}{0.7}$

$\boxed{97.031 \text{ to } 97.969}$

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2. You take your ear temperature and find it to be 97.9°F. Is your temperature unusual compared to what is described by the Normal model? Explain.

$$z = \frac{97.9 - 98.7}{0.7}$$

$z = -1.14$

$P(Z = -1.14) = 12.71\%$

The temperature is low but not that unusual. 12.71% of people have temperatures lower than that.

3. Adult female Dalmatians weigh an average of 50 points with a standard deviation of 3.3 pounds. Adult female Boxers weigh an average of 57.5 pounds with a standard deviation of 1.7 pounds. At the animal shelter are a female Dalmatian weighing 45 pounds and a female Boxer weighing 52 pounds. Which dog is more underweight?

Dalmation: $\frac{45-50}{3.3}$

$z = -1.52$

Boxer $\frac{52-57.5}{1.7}$

$z = -3.24$

The Boxer is more underweight

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4. A roadway construction process uses a machine that pours concrete onto the roadway and measures the thickness of the concrete so the roadway will measure up to the required depth in inches. The concrete thickness needs to be consistent across the road, but the machine isn't perfect and it is costly to operate. Since there's a safety hazard if the roadway is thinner than the minimum 23-inch thickness, the company sets the machine to average 26 inches for the batches of concrete. They believe the thickness level of the machine's concrete output can be described by a Normal model with standard deviation 1.75 inches.

   a. What percent of the concrete roadway is under the minimum depth of 23 inches?

   $z = \frac{23-26}{1.75}$

   $z = -1.71$

   $\boxed{4.36\%}$

   b. If you were able to make the standard deviation smaller, what would that do to your overall distribution?

   It would make the road thickness less variable.